32A Killip Homework 6 Due Friday, Nov. 17

- Use the ϵ-δ definition to show that the following functions are continuous at $(x, y) = (0, 0)$:
$$f(x, y) = 7, \qquad f(x, y) = x^2 - y^2$$
- Section 15.2: 14, 20, 28, 40.
- Section 15.3: 16, 32, 34, 52, 68, 76.
- Section 15.4: 8, 14, 39. (Note the book's answer to the last problem cannot be completely correct — volume is not measured in meters!)
- Section 15.5: 12, 30.
- Consider the surface $z = \sqrt{x^2 + y^2}$, similar to that in Exercise 15.5.48. (a) Show that the plane tangent to this surface at any point $(x, y, z) \neq (0, 0, 0)$ passes through the origin. (b) Explain why the point (0,0,0) was excluded.
- Consider a gas whose pressure P, volume V, and temperature T are related by
$$\big(P + \tfrac{1}{V^2}\big)V = T.$$
as well as the following path, defined for $t > 0$:
$$\begin{pmatrix} V(t) \\ T(t) \end{pmatrix} = \begin{pmatrix} t \\ t^{-3/2} \end{pmatrix}$$
(a) Writing P as a function of V and T, determine
$$\frac{\partial P}{\partial V}(V(t), T(t))$$
(b) Now compute
$$\frac{d}{dt} P(V(t), T(t))$$